

# इंटरनेट

# मानक

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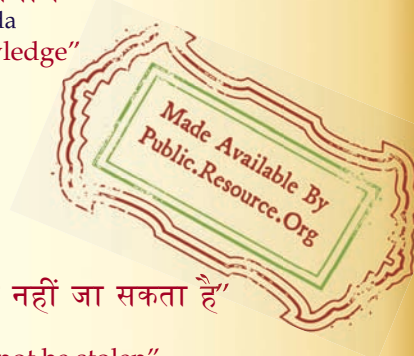
IS 8309 (1993): Compression type tubular terminal ends for aluminium conductors of insulated cables [ETD 9: Power Cables]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



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**AMENDMENT NO. 1 DECEMBER 2000  
TO  
IS 8309 : 1993 COMPRESSION TYPE TUBULAR  
TERMINAL ENDS FOR ALUMINIUM CONDUCTORS OF  
INSULATED CABLES — SPECIFICATION**

**( First Revision )**

*( Page 3, Table 1, col 6, Row 10, Designation CAA-50 ) — Substitute  
'18.0-18.6' for '8.0-18.6'.*

*( Page 3, Table 1, col 6, Row 13, Designation CAA-120 ) — Substitute  
'27.7-28.3' for '27.7-38.3'.*

**(ETD9)**

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**भारतीय मानक****विद्युत रोधित केबलों के एल्युमिनीयम संचालकों के संपीड़न टाइप  
के लाइनगत कनेक्टरों की विशिष्टि****( पहला पुनरीक्षण )****Indian Standard****COMPRESSION TYPE TUBULAR TERMINAL ENDS FOR ALUMINIUM  
CONDUCTORS OF INSULATED CABLES — SPECIFICATION****( First Revision )****1 Scope**

1.1 Prescribes material and dimensional requirements of aluminium compression type tubular terminal ends for aluminium conductors of insulated cables for rated voltages up to and including 11 kV.

**2 Terminology****2.1 Terminal End**

A connecting device with barrel accommodating respective conductor size of electrical cable and which has a fixing arrangement of termination by means of a bolt fixing or pin insertion in tunnel type terminal blocks and screwing.

**3 Material**

Aluminium of Grade 19501 of IS 5082 : 1981 'Specification for wrought aluminium and aluminium alloy bars, rods, tubes and sections for electrical purposes (first revision)'.

**4 Finish**

4.1 The inside of the barrel shall either be suitably roughened throughout the crimping length of terminal end or provided with suitable grease based compound with abrasive action.

4.2 Edges and corners shall be free from burrs and sharp edges.

**5 Dimensions**

Dimensions of terminal ends shall be as given in Tables 1 and 2.

**6 Marking**

Terminal ends shall be marked with the designations as given in Tables 1 and 2.

**6.1 BIS Certification Marking**

Details available with the Bureau of Indian Standards.

**7 Recommended Sampling Plan**

See Annex A.

**8 Tests****8.1 Visual Examination and Dimensional Check-up**

Check for dimensions as given in the relevant Tables and also examine for freedom from flaws, rust, crevices, cracks and other defects harmful for the joint.

July 1993

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## **8.2 Flattening Test**

Place the test piece between two plane, parallel rigid platens extending over a length not more than 75 percent of the barrel. Apply a gradually increasing load until the internal surfaces are in contact over at least half of the internal width of the flattened test piece. At the end, observe if there is any crack. Reject if any crack is seen.

**Note** — In case of dispute, the rate of movement of the platens shall not exceed 25 mm/min.

## **8.3 Electrical Conductivity Test**

Electrical conductivity shall be determined with the instrument that indicates the resistance of the material to the flow of eddy-current. The instrument shall be of such design that eddy-currents are induced in the test specimen by means of the coil located in the detector tip. The apparent impedance of the coil, which varies with the electrical conductivity of the specimen being tested, is measured (by the balanced bridge circuit or otherwise) in such a manner that the indicating dial or meter may be calibrated to indicate the percent conductivity of the metal.

The accuracy of the conductivity measurements obtained with an eddy-current instrument will vary somewhat with the conditions under which the test is made. The error of the instrument, however, shall not exceed  $\pm 1.5$  percent of the scale reading.

### **8.3.1 Test specimen**

The test specimen after the flattening test shall be used for the electrical conductivity test. The degree of flatness and smoothness can effect the test results significantly. The test specimen should have a minimum flat dimension more than or equal to the diameter of the detector tip. The thickness of the specimen shall be not less than the depth of the penetration of the eddy-current induced by the detector tip, which will vary with the frequency of the existing voltage and the resistivity of the specimen. In any case, the thickness of the specimen shall be not less than that recommended by the instrument manufacturer.

### **8.3.2 Test procedure**

Allow the instrument prior to making the tests, to warm up for a minimum period of time in accordance with the recommendations of the instrument manufacturer.

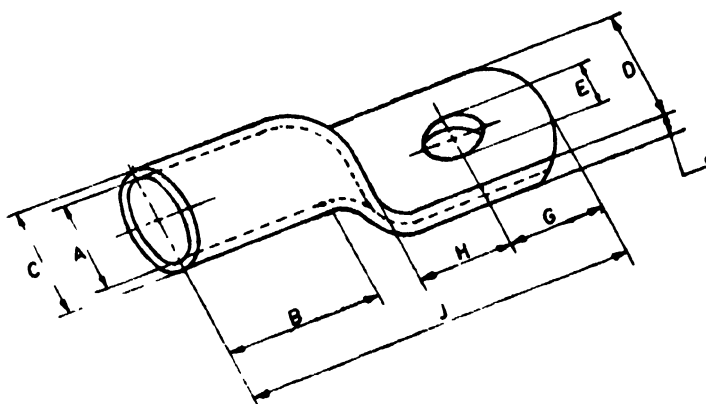
After the warm up period, adjust the instrument using atleast two standards of known conductivity including values in low and high range of measuring scale. Make the adjustment in accordance with the instructions of the manufacturer of the instrument, and check them sufficiently often to ensure that the instrument calibration remains in proper adjustment.

### **8.3.3 Test value**

The electrical conductivity measured shall not be less than 60 percent IACS.

**Table 1 Compression Type Aluminium Tubular Terminal Ends for Crimping to Aluminium Conductors**

( Clauses 5 and 6 )



All dimensions in millimetres.

Designa- tion*	$\phi E$ $\pm 0.1$	$\phi E$ $\pm 0.1$	$\phi A$	$\phi C$	D	F	B†	H†	G†	J†
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CAA-2.5	3.2	-	1.9-2.1	5.4-5.6	6.3-6.9	3.3-3.7	7	4	4	18
CAA-2.5	3.2	3.7	2.5-2.7	5.4-5.6	6.7-7.3	2.7-3.1	7	4	4	18
CAA-4	3.2	4.2	2.8-3.0	5.4-5.6	6.9-7.5	2.4-2.8	7	4	4	18
CAA-6	3.2	5.2	3.4-3.6	5.4-5.6	7.2-7.8	1.8-2.2	7	7	6	24
CAA-10	4.2	5.2	3.7-3.9	6.1-6.3	8.1-8.7	2.2-2.6	7	9	8	28
CAA-10	4.2	6.4	4.3-4.5	7.1-7.3	9.4-10.9	2.6-3.0	9	9	8	30
CAA-16	5.2	8.2	5.3-5.5	8.2-8.4	11.1-11.7	2.7-3.1	13	11	9	37
CAA-25	6.4	10.2	6.8-7.1	9.6-9.8	13.4-14.0	2.5-2.9	16	11	10	44
CAA-35	6.4	10.2	7.8-8.1	10.7-10.9	15.1-15.7	2.6-3.0	18	11	11	47
CAA-50	6.4	10.2	9.1-9.4	12.9-13.1	8.0-18.6	3.4-4.0	22	13	11	54
CAA-70	8.2	12.7	11.1-11.4	15.4-15.6	21.7-22.3	3.9-4.5	26	13	13	60
CAA-95	10.2	12.7	13.0-13.3	17.3-17.5	24.6-25.2	3.9-4.5	28	14	14	64
CAA-120	10.2	16.2	14.5-14.9	19.5-19.7	27.7-38.3	4.5-5.1	32	15	15	73
CAA-150	10.2	16.2	16.2-16.6	21.4-21.6	30.6-31.2	4.7-5.3	34	17	17	79
CAA-185	10.2	16.3	18.2-18.6	23.9-24.1	34.2-35.0	5.0-6.0	36	18	18	84
CAA-240	12.7	20.3	20.7-21.3	27.9-28.2	39.6-40.6	6.3-7.3	44	22	22	102
CAA-300	16.2	20.3	23.5-24.1	30.9-31.2	44.2-45.2	6.5-7.5	47	27	27	115
CAA-400	16.2	20.3	26.5-27.1	35.4-35.7	50.5-51.5	7.8-9.2	56	31	30	130
CAA-500	20.3	-	29.5-30.2	40.9-41.2	57.4-58.8	10.1-11.9	60	33	32	140
CAA-630	20.3	-	34.5-35.2	45.9-46.2	65.4-66.0	10.1-11.9	59	35	34	154
CAA-800§	-	-	38.5-39.2	50.9-51.2	72.5-74.1	11.1-12.9	77	39	39	180
CAA-1 000§	-	-	43.0-43.7	56.8-57.2	80.9-82.9	12.5-14.5	100	45	45	220

\* First letter 'C' stands for jointing method, that is, compression; Second letter 'A' for terminal and material, Aluminium; Third letter 'A' for applicable conductor material, that is, Aluminium, 'a' for single strand conductor and 'A' for multistrand conductor, where depending upon conductor construction, for a particular conductor size two terminal ends are specified, and numerals separated by a hyphen from the third letter stands for nominal conductor size in mm<sup>2</sup>.

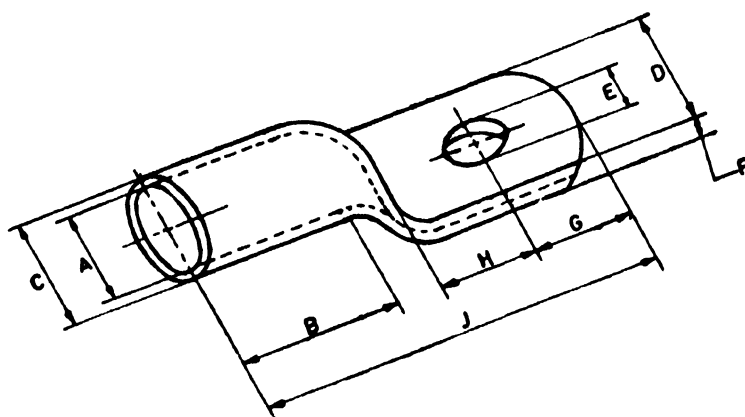
† If the purchaser desires to have a larger stud hole than the standard hole specified in col 2, stud hole size shall be chosen from 3.7, 4.2, 6.4, 8.2, 10.2, 12.7, 16.2 and 20.3 mm subject to maximum as given in col 3.

‡ Tolerances on B, H, G and J are  $\pm 5$  percent.

§ These terminal ends are without stud holes (blank).

**Table 2 Compression Type Aluminium Tubular Terminal Ends for Crimping to Aluminium Conductors ( Round Stranded Compacted ) for XLPE Cables**

(Clauses 5 and 6)



All dimensions in millimetres								
Designation*	$\phi E$ $\pm 0.1$	$\phi A$	$\phi C$	$D$	$F$	$B$	$H$	$G$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CAAX-16	8.4	5.6-5.9	10.0-10.5	16.0-16.5	3.1-3.8	32	10	8
CAAX-25	8.4	6.8-7.1	12.0-12.5	16.0-16.5	4.9-5.7	32	10	8
CAAX-35	10.5	8.0-8.3	14.0-14.5	20.0-20.5	5.7-6.5	42	12	10
CAAX-50	10.5	9.3-9.6	16.0-16.5	21.5-22.0	6.4-7.2	42	12	10
CAAX-70	13.0	11.2-11.6	18.5-19.0	25.0-25.5	6.9-7.8	52	15	13
CAAX-95	13.0	12.2-13.6	22.0-22.5	30.0-30.5	8.4-9.3	56	15	13
CAAX-120	13.0	14.7-15.1	23.0-23.5	31.5-32.0	7.9-8.8	56	20	15
CAAX-150	13.0	16.3-16.7	25.0-25.5	34.5-35.0	8.3-9.2	60	20	15
CAAX-185	17.0	18.3-18.7	28.5-29.0	39.5-40.0	9.8-10.7	60	20	15
CAAX-240	17.0	21.0-21.4	32.0-32.5	44.5-45.0	10.6-11.5	70	24	19
CAAX-300	17.0	23.3-23.7	34.0-34.5	47.5-48.0	10.3-11.2	70	24	19
CAAX-400	17.0	26.0-26.4	38.5-39.0	53.5-54.0	12.1-13.0	75	24	19
CAAX-500	17.0	29.0-29.4	44.0-44.5	60.5-61.0	14.6-15.5	80	24	22
CAAX-630	17.0	34.0-34.4	50.0-50.5	69.5-70.0	15.6-16.5	90	28	26

\* First letter 'C' stands for jointing method - compression

Second letter 'A' stands for terminal and material - Aluminium

Third letter 'A' stands for applicable cable conductor material, Aluminium

Fourth letter 'X' stands for XLPE cables

**Note** — Tolerances on  $B$ ,  $H$ ,  $G$  and  $J$  are  $\pm 5\%$



## ANNEX A

### RECOMMENDED SAMPLING PLAN FOR TERMINAL ENDS

( Clause 7 )

#### A-1 Lot

In any consignment, the terminal ends of the same type manufactured by the same factory during the same period shall be grouped together to constitute a lot.

#### A-2 Scale of Sampling

From each lot a certain number of terminal ends shall be selected at random and subjected to tests (see 8). Any terminal end failing to satisfy the appropriate requirement specified in the specification shall be considered as defective.

**A-2.1** The number of terminal ends to be selected depend on col 1 and 2 of Table 3. The terminal ends shall be selected at random.

**Table 3 Scale of Sampling**

( Clause A-2.1 )

Lot Size $N$	First Stage	Second Stage	$2n$	$C_1$	$C_2$	$C_3$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Up to 300	8	8	16	0	2	2
301 to 500	13	13	26	0	3	4
501 to 1 000	20	20	40	1	4	5
1 001 and above	32	32	64	2	5	7

**A-2.1.1** In order to randomness for selection, random number tables shall be used (see IS 4905 : 1968 Methods for random sampling).

#### A-3 Number of Tests and Criteria for Acceptance

Each of the terminal end selected in the first sample in accordance with col 2 of Table 3 shall be tested for visual examination, dimensional check up and flattening test (see 8). If the number of defectives is less than or equal to  $C_1$ , the lot shall be considered as conforming to the requirements of the standard. If the number of defectives is equal to or greater than  $C_2$  the lot shall be considered as not conforming to the requirements of the standard. If the number of defective in the first stage is between  $C_1$  and  $C_2$ , a further sample of same size as taken in the first stage shall be taken and tested. If the number of defectives in the two samples combined is less than  $C_3$ , the lot shall be considered as conforming to the requirements of the test, otherwise not.